3.11 CUMULATIVE EFFECTS

The cumulative impacts of the rule proposal and the alternatives are addressed in the previous sections in terms of how application of the rule changes would cumulatively effect the different resource areas subject to forest practices rules. This section also addresses the cumulative effect of rule changes on a watershed scale and also considers the cumulative effect on a broader landscape scale, when added to management on non-federal forest land covered by HCPs, federal forest land, watershed planning, and other state and federal programs.

3.11.1 Watershed Cumulative Effects

Cumulative effects are defined in the forest practices rules as "the changes to the environment caused by the interaction of natural ecosystem processes with the effects of two or more forest practices" (WAC 222-16-010). Multiple forest practices include all possible combinations of forest practices including those occurring on the same site over time, or widely dispersed within the forest, occurring simultaneously or in a sequential manner (Geppert et al. 1984). The alternatives each address cumulative effects within a watershed, but to different degrees.

Under Alternative 1, cumulative effects would be addressed in watersheds that undergo watershed analysis. However, cumulative impacts would occur in other watersheds, especially those with high levels of past harvest or other disturbances.

3.11.1.1 Alternative 1

Under Alternative 1, the forest practices rules in general (WAC 222) address cumulative effects by establishing minimum standards for all forest practices. In addition, cumulative watershed effects are addressed directly by a number of specific rules (see WAC 222-12-046). The primary specific rule that address cumulative effects is watershed analysis. A number of other rules including those dealing with Class IV-Special applications, road maintenance and abandonment plans, harvest unit size, green-up, and separation requirements, further restrictions on the size of clear-cuts in rain-on-snow zones, and adaptive management, also address it.

Ideally, watershed analysis (chapter 222-22 WAC) would be an effective way of evaluating cumulative effects and modifying forest practices in watersheds where it has been conducted. However, a small minority of watersheds have been analyzed to date (see

Appendix H). In addition, many watershed analyses started have not been completed because negotiations during the prescription phase have stalled, primarily over riparian issues (M. Hunter, WDFW, personal communication, January 19, 2001). On occasion, prescriptions have also varied widely, even for adjacent watersheds with similar situations (M. Hunter, WDFW, personal communication, January 19, 2001). Much of this variability has resulted from the negotiating abilities of the parties preparing the prescriptions (M. Hunter, WDFW, personal communication, January 19, 2001). Other deficiencies in watershed analysis, as implemented in the past, have been outlined in Collins and Pess, 1997a and 1997b). Overall, watershed analysis has been an effective tool for understanding watershed conditions and their relationship with forest practices, but has been less effective at implementing prescriptions designed to prevent cumulative effects.

Forest practices which have a potential for substantial impact on the environment are classified as Class IV-Special or Class IV-General by WAC 222-16-050 and receive an evaluation as to whether or not a detailed environmental statement under SEPA must be prepared. Thus, cumulative effects are considered through the SEPA process, when the individual forest practices that triggered SEPA have potential for substantial impact.

Cumulative effects are also addressed when the Department of Natural Resources requires a road maintenance and abandonment plan for a drainage or road system where damage to public resources is occurring or has potential to occur (WAC 222-24-050). They are also addressed by harvest unit size and separation requirements that restrict the size of clear-cuts and the harvesting of units adjacent to young stands (WAC 222-30-025). Restrictions can also be placed on the size of clear-cuts in the significant rain-on-snow zone, if the Department determines that, based on local evidence, peak flows have resulted in damage to public resources (WAC 222-22-100).

Adaptive management (WAC 222-08-035 and 222-12-045) is a process that also addresses cumulative effects. However, the adaptive management process under Alternative 1 is relatively informal and does not address cumulative effects on a watershed basis, except over the long term. Watershed analysis has historically been, and would continue to be, one of the primary sources of feedback on the effectiveness of forest practices rules for use in adaptive management, under Alternative 1.

As noted in previous sections, the standards established by the current forest practices rules (Alternative 1) are generally insufficient to avoid resource impacts, particularly when evaluated in a cumulative sense with other forest practices. An exception to this is when watershed analysis is implemented and is used to modify and implement effective prescriptions and other practices that address cumulative effects. However, watershed analysis is voluntary and has only been implemented on a minority of watersheds to date.

3.11.1.2 Alternative 2

Under Alternative 2, the forest practices rules in general address cumulative effects by establishing minimum standards for all forest practices. A number of additional rules also address cumulative effects including: those dealing with Class IV-special applications, road maintenance and abandonment plans, harvest unit size and separation requirements,

Under Alternative 2, cumulative effects would be addressed in watersheds that undergo watershed analysis, but only to a limited degree since riparian and other prescriptions would not be modified and fewer watershed analyses would be conducted. It is not clear that the rules under Alternative 2 are sufficiently protective to prevent cumulative effects in watersheds containing high levels of past harvest or other disturbances.

further restrictions on the size of clear-cuts in rain-on-snow zones, and adaptive management.

Watershed analysis could still be used to assess cumulative effects. However, implementation is voluntary for landowners and riparian prescriptions designed for the conditions observed in the watershed would no longer be a required product (See Appendix H). In addition, the mass wasting module and surface erosion prescriptive phase would be phased out when the unstable slope hazard map and road maintenance and abandonment plans become available. Cultural resources and restoration modules will be developed and added to the watershed analysis methodology. Consequently, the cost of conducting the assessment phase would increase, but most benefits to a private landowner from the prescriptive phase would be lost. Therefore, it appears that watershed analysis would be conducted less frequently in the future under Alternative 2 because of reduced incentive and higher costs to private landowners.

Forest practices which have a potential for substantial impact on the environment would continue to be classified as Class IV-Special or Class IV-General and receive an evaluation as to whether or not a detailed environmental statement under SEPA must be prepared. In Alternative 2, the SEPA process is more defined by guidelines to ensure a comprehensive review of potential effects of proposed forest practices. A variety of forest practices may trigger a Class IV-Special application including (among others, see chapter 222-16 WAC):

- Certain types of pesticide use including use within a Type A or B wetland;
- Timber harvest, or construction of roads, landings, gravel pits, rock quarries, or spoil disposal areas:
  - on potentially unstable slopes or landforms;
  - in high avalanche hazard areas if no watershed analysis has been conducted; or
  - in archaeological or historic sites.

Thus, cumulative effects are considered through the SEPA process, when the individual forest practices that triggered SEPA have potential for substantial impact.

Cumulative effects are also addressed because of the requirement under this alternative for road maintenance and abandonment plans and their implementation by 2015. These plans should address the cumulative impacts within a watershed associated with roads over the next 15 years. Cumulative effects would continue to be addressed by harvest unit size and separation requirements that restrict the size of clear-cuts and the harvesting of units adjacent to young stands. Restrictions could also still be placed on the size of clear-cuts in the significant rain-on-snow zone, if the Department determines that, based on local evidence, peak flows have resulted in damage to public resources.

Over the long term, the adaptive management process under Alternative 2 would result in cumulative effects being more fully addressed. The program includes effectiveness monitoring for prescriptions that is expected to be focused in representative watersheds throughout the state (M. Hunter, WDFW, personal communication, January 19, 2001).

This process is formal, includes review by an independent scientific committee, and a mechanism for resolving disputes when stakeholders cannot reach consensus. The adaptive management program is expected to be productive over the long term.

There is uncertainty regarding the effects of the lack of RMZ buffers on many Type N streams under Alternative 2. This uncertainty is increased in watersheds with a high level of recent past harvest, because cumulative effects may not be addressed.

As noted in previous sections, the standards established by the rules of Alternative 2 generally have a low to moderate level of risk for not adequately avoiding resource impacts; however, there is a high degree of uncertainty associated with the effectiveness of certain rules. This uncertainty is generally related to the lack of RMZ buffers on many Type N_p and all Type N_s streams. The uncertainty relates to issues regarding effects on sediment delivery to fish streams, LWD and leaf/needle litter recruitment from non-fish to fish streams, and the effects of shade reduction and microclimate changes on non-fish stream temperatures and their ultimate effect on fish stream temperatures. In addition, there is some concern over the sufficiency of eastside RMZs on Type S and F waters for providing LWD. These are areas that deserve emphasis with adaptive management. However, adaptive management is a relatively long-term process and the issues identified are of concern in the short term in watersheds that have experienced a high degree of past timber harvest, contain significantly degraded fish habitat, or contain temperature or sediment-impaired streams. The lack of any consistently applied rules under Alternative 2 for assessing current watershed condition increases the level of resource risk relative to these uncertain issues.

3.11.1.3 Alternative 3

Alternative 3 would also address cumulative effects to a limited degree through watershed analysis and through additional rules related to cumulative harvest in ROS zones and road densities. Also, the riparian rules would be substantially more protective than under Alternatives 1 or 2.

As for Alternatives 1 and 2, Alternative 3 would address cumulative effects by establishing minimum standards for all forest practices. In addition, cumulative watershed effects are addressed directly by watershed analysis. A number of specific rules, including those addressed by Alternative 2, also address cumulative effects. Two additional cumulative effects measures would also be included: no net increase in road density and restrictions on cumulative harvest in rain-on-snow zones.

Forest practices would continue to be conditioned through the forest practices application process (with Class IV-special applications), through restrictions on harvest unit size, through watershed analysis (although it would likely be implemented with less frequency than at present and without the riparian module), and through adaptive management (over the long term). Cumulative effects would also be addressed because of the requirement under this alternative for road maintenance and abandonment plans and their implementation by 2010. These plans should address the cumulative impacts within a watershed associated with roads over the next 10 years. In addition, road-related cumulative effects would also be reduced by the restriction on increasing road densities. Finally, restrictions on the cumulative harvest within the rain-on-snow zone of a watershed would be implemented.

The standards established by the rules of Alternative 3 are generally more protective than those under either Alternative 1 or 2. In most cases, they are sufficiently protective to substantially reduce the uncertainty associated with risk to aquatic resources that is associated with some aspects of Alternative 2. However, in the short term, watersheds that have experienced a high degree of past timber harvest, contain significantly degraded fish

habitat, or contain temperature or sediment-impaired streams, may still need additional protection. Without a consistent general assessment of current watershed condition prior to conducting forest practices in these watersheds and implementation of additional protection measures where needed, the level of resource risk is increased.

3.11.2 Landscape-level Cumulative Effects

The changes to forest practice rules that are proposed under Alternatives 2 and 3 have been developed through more than 10 years of TFW discussions and research. These changes are just one aspect of far-reaching regulatory, policy, and land-use management changes that are occurring in Washington as a response to ESA listings for Pacific Salmon and trout, CWA listings for water quality impaired streams, and a general understanding that current forest practice rules (Alternative 1) are inadequate to protect aquatic and riparian resources. Plans are being developed at all levels of government throughout Washington to maintain and recover populations of the listed species, improve water quality, and address water quantity issues.

3.11.2.1 Habitat Conservation Plans

HCPs outline mechanisms for conserving and monitoring listed species and mitigating for their losses incidental to otherwise lawful practices.

ESA Section 10 provides for Incidental Take Permits and Habitat Conservation Plans that provide regulatory protection from the ESA Take Prohibition (Section 9) for a period of usually 30 to 50 years, but sometimes more. Incidental take occurs when it results during otherwise lawful practices. The HCPs outline mechanisms for conserving and monitoring listed species and mitigating for their losses. Incidental Take Permits quantify an acceptable amount of take that will not jeopardize the existence of the listed species and permit-holders are not at risk of Section 9 violations so long as take remains below the permit levels. Many HCPs have been prepared in the Pacific Northwest region by government and private entities since implementation of the ESA. Most of the HCPs prepared in Washington address issues concerning multiple listed wildlife and/or aquatic species. Some of the HCPs and their issues that have been completed or are in progress in Washington include:

- Mid-Columbia Public Utility Districts - Hydroelectric;
- Washington State DNR – Forestlands;
- Plum Creek I-90 HCP and Native Fish HCP – Forestlands;
- Murray Pacific HCP – Forestlands
- City of Seattle Cedar River – Forestlands and Drinking Water Supply;
- International Paper (formerly Champion Pacific Timberlands) - Forestlands;
- City of Tacoma – Forestlands and Hydroelectric;
- Longview Fibre - Forestlands;
- Rayonier - Forestlands;
- Crown Pacific - Forestlands;
- Port Blakely - Forestlands;
- West Fork Timber Co. (formerly Murray Pacific) - Forestlands;

- Simpson Timber Company - Forestlands;
- Lewis County Programmatic – Non-Industrial Tree Farms;
- King County - Wastewater Treatment; and
- Foster Creek Conservation District – Ranching and Agriculture.

The WDFW is considering an HCP for Hydraulic Project Approvals, but other options are also being considered for meeting ESA requirements. Many of the HCPs that have been implemented in forested areas have larger riparian buffers and other conservation measures for listed species than existing forest practices rules. For instance, the DNR HCP requires the state to use a riparian conservation strategy on all of its ownership which has as one of its goals to protect the breeding, foraging, and resting habitats of the Dunn's salamander, Van Dyke's salamander, and tailed frog through the application of minimum 100-foot wide buffers on Type 1, 2, 3, and 4 streams. This strategy is enhanced in the Olympic Experimental Forest Planning Unit, which borders the western edge of Olympic National Forest. Many of the HCPs for private forestlands require watershed analysis, habitat reserves, or a number of other special features that benefit aquatic and riparian systems.

3.11.2.2 The Northwest Forest Plan

Implementation of the Northwest Forest Plan (NFP) has particular relevance to alternatives evaluated in this EIS because state and private forestlands are often adjacent to, or exist as inholdings within Federal ownership. In addition, Federal ownership affected by the Forest Plan includes up to about one-third of the land base of the EIS regions in the western half of Washington. The NFP has management strategies designed specifically for aquatic and riparian species.

Protection of aquatic and riparian species under the NFP is part of the Aquatic Conservation Strategy (ACS) and Survey and Manage Protocols (USDA et al., 1994). Components of the ACS include Riparian Reserves, protection of Key Watersheds, Watershed Analysis, and Watershed Restoration. Riparian Reserves on federal lands within the range of the Northern Spotted Owl are a minimum of 100 feet (seasonal streams) to 300 feet (fish-bearing streams) in width on either side of a stream. Consequently, streams on most federal lands within Washington have more protection for aquatic and riparian-associated wildlife than any of the alternatives considered in this EIS. Notably, a majority of federal lands are located along the Cascade Crest and northern Olympic Peninsula. Consequently, on a broad-scale federal lands include a higher proportion of low order, nonfish-bearing streams compared to state and private forest lands. Survey and Manage protocols require individuals applying to conduct activity on federal lands to survey for a wide variety of wildlife species, including many amphibians, and subsequently manage for those species if they are discovered in the vicinity of a proposed project.

The Aquatic Conservation Strategy implemented under the NW Forest Plan on federal lands will complement the strategies considered under Alternatives 2 and 3.

The current size of stream buffers on federal lands should not be construed to mean that streams on federal lands are currently in better condition than streams on private lands. In fact, historic forest practices, including harvest of riparian trees, on federal lands have also contributed significantly to stream conditions that have affected the status and listing of Pacific salmon and trout in the region. However, as the ACS is implemented in the long-

term, stream protection strategies on federal lands will complement the strategies considered under Alternatives 2 and 3, particularly in watersheds with substantial amounts of federal and private mixed ownership. Under Alternative 1, maintenance of properly functioning streams and recovery of degraded streams may not be possible in forested watersheds with high proportions of private ownership.

3.11.2.3 Watershed Planning

Development of watershed plans that address water quantity, water quality, fish habitat, and instream flows are in progress in many areas of the state.

Watershed planning is an option that state, local, and tribal governments may pursue as a result of the Watershed Planning Act (House Bill 2514). The goals of the plans are to assess the status of water resources, and to address water quantity issues including mechanisms for accommodating competing water resource needs. In addition, the plans may address water quality, habitat, or proposals for setting or revising instream flows. Although plans are optional, they must meet requirements outlined in HB 2514 to obtain state funding. The plans can include a single or multiple watershed resource inventory area (WRIA). Watershed Plans have been initiated for more than half of the WRIAs. None of the plans have been completed. Most of the plans in development will include all of the optional components, but this is not universal.

3.11.2.4 Other State and Federal Programs

Numerous other federal management activities and policies will also influence the overall success of recovering listed species. These include:

- Management of the Federal Columbia River Hydroelectric System (Corps of Engineers, Bureau of Reclamation, Bonneville Power Administration, and the Northwest Power Planning Council);
- Implementation of the Pacific Salmon Treaty;
- Implementation of the Northwest Forest Plan (NFP, US Forest Service and Bureau of Land Management);
- National Parks and Wilderness Areas;
- Re-licensing of private hydroelectric facilities (Federal Energy Regulatory Commission);
- Water quality enforcement (Environmental Protection Agency); and
- Permitting of flood control, wetland development, and dredging projects (Corps of Engineers).

Under Section 7 of the ESA, all activities that require direct federal management activities or obtain federal funding that might affect listed species require consultation with the NMFS or FWS. These activities usually require a Biological Assessment by the consulting agency and a Biological Opinion by NMFS or FWS if the activity will have an adverse effect.

Numerous state and federal programs under development will complement new forest practices rules.

Water quality programs by the Environmental Protection Agency and Washington's Department of Ecology will complement new forest practice rules. Over 600 water bodies of the state do not meet water quality standards and are listed as Clean Water Act Section 303(d) water quality impaired streams. These agencies have a Memorandum of Understanding concerning implementation of the state's Total Maximum Daily Load

(TMDL) program for addressing non-point source stressors to water quality. Prescriptions implemented on private forestlands under this program will complement water quality protections present in FPRs.

Governor Locke and the Joint Natural Resources Cabinet have developed a plan called the "Statewide Strategy to Recover Salmon" (Washington State JNRC, 1999). Improvements to forest practices rules is just one component to the plan's 13 basic elements. The other 12 components include the following:

- Agricultural practices
- Urban stormwater issues
- Land-use practices
- Hydropower
- Commercial and recreational fish harvest
- Hatcheries
- Water quantity
- Water quality
- Enforcement of existing laws
- Education
- Monitoring
- Integration of stream corridor guidelines

The primary agencies and organizations the Governor has targeted for implementing the plan include the following (WDFW, 1999):

- Department of Fish and Wildlife
- Department of Ecology
- Department of Natural Resources
- Department of Agriculture
- Conservation Commission
- Timber, Fish, and Wildlife
- Department of Community, Trade, and Economic Development
- Tribal Governments
- City and County Government and Agencies

It is important to understand that all of the elements of the Governor's Salmon Plan, the local and county plans, and many of the various habitat conservation plans are still in development. It is reasonable to believe that many these programs will be implemented within the next one to five years. However, it is unclear what precisely will be included in all of the different programs. Consequently, it is not possible to accurately describe details of all of the cumulative effects that may result from the alternatives evaluated in this EIS and other programs.

One of the more complete components is the Wild Salmonid Policy developed by the WDFW and Western Washington Treaty Tribes in 1997. However, the Wild Salmonid Policy (WSP) is designed as a living document that will be updated as the available science improves. Under the WSP, numerous policies related to salmonid habitat, aquaculture, harvest, and other issues were developed to guide existing and future management. Included in the policy were riparian management prescriptions for forested areas that were specifically described as interim until they were replaced by prescriptions agreed to under the Forest and Fish Report.

In part, it is the intent that the development of the different strategic elements in the Governor's Salmon Plan will result in regulations, permit processes, and other formalized programs that will be reviewed, approved by the NMFS and/or FWS, and then included as part of their ESA Section 4(d) rules. The 4(d) rules allow the Services (NMFS and FWS) to implement limitations to take prohibitions under Section 9 of the ESA. "Take" includes killing or injuring listed species, and harm or harassment due to habitat destruction or other activities. The 4(d) rules describe which kinds of activities, when implemented according to approved guidelines, will not result in take of the listed species. Under the 4(d) rules recently published by the NMFS (65 FR 42422, , 65 FR 170,and 64 FR 73479), the Forests and Fish Report was specifically cited as an example of forest practices rule changes that would limit take prohibitions. In other words, as long as forest practices rules were implemented under prescriptions at least as protective as strategies described in the Forests and Fish Report, then forest practices activities could continue without fear of violating the ESA. The USFWS has not adopted a 4(d) rule for bull trout or sea-run cutthroat trout, however, the Forest and Fish Report includes assurances that such a rule for bull trout would be adopted by July 1, 2001.

3.11.2.5 Conclusion

In combination, the various programs and plans described above, reflect a significant wide-spread effort and financial commitment to improve water quality, put listed species on a positive trend towards recovery, and provide substantial protection for other aquatic and riparian-associated species. For the most part, the strategies and programs are complementary and reflect different land management goals and activities that are needed to maintain economic viability in the region and meet legal and environmental responsibilities under the ESA and CWA. From the perspective of cumulative effects, Alternative 1 is unlikely to meet the level of protection needed for the forest practices industry to play its part in the recovery process. In contrast, both Alternatives 2 and 3 provide significant additional protection that complements other activities in the region. Alternative 3 has more certainty for achieving adequate protection to resources in the short-term because the proposed prescriptions are more conservative than Alternative 2.. Specific adjustments could be made to Alternative 2 that would increase short-term certainty, particularly with regard to cumulative watershed measures (see Section 3.11.1.2). Both Alternatives 2 and 3 incorporate adaptive management in their approach, which is a cornerstone to nearly all of the plans, policies, and programs mentioned above. Consequently, in the long-term both alternatives should result in adequate protection levels

and plans under development reflect a significant wide-spread effort to put listed species on a positive trend towards recovery.

that would result in improvements in water quality, the opportunity for recovery of listed species, and improved habitat for aquatic/riparian fish and wildlife.

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